DEC STD 070-13 Video Systems Reference Manual—Text Locator Extension

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ABSTRACT: This specification defines support for locator input devices on ANSI text and graphics terminals as an extension to the Character Cell Display service class.

APPLICABILITY: Mandatory for engineers designing hardware for terminal products and software engineers designing programs using terminal interfaces. Additional requirements are defined in DEC STD 070-1 Video Systems Reference Manual - Concepts and Conformance Criteria.

STATUS: APPROVED 30-Sep-1991; use VTX SMC for current status.

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1 INTRODUCTION

This specification defines support for locator or pointing devices on ANSI text and graphic terminals as an extension to the Character Cell Display service class. Pointing devices are used for entering coordinates or selecting items on a display.

A conforming device shall be supplied with a locator port used to connect an optional mouse or tablet. When a locator device is present and enabled, a separate input cursor appears that is moved by the terminal to follow the locator without host intervention. Individual locator events, such as locator button transitions or movements, can be programmed to send locator reports to the host.

Once enabled, locator reports can be unsolicited (event driven) and mixed freely with keyboard input.

Controls are provided to enable locator reporting, select which events shall generate reports, and interrogate the status of the locator device.

This specification is primarily concerned with the Text Locator Extension, but also documents a simplified locator interface that forms the Locator Port Extension. Requirements apply to the Text Locator Extension unless explicitly indicated in the text.

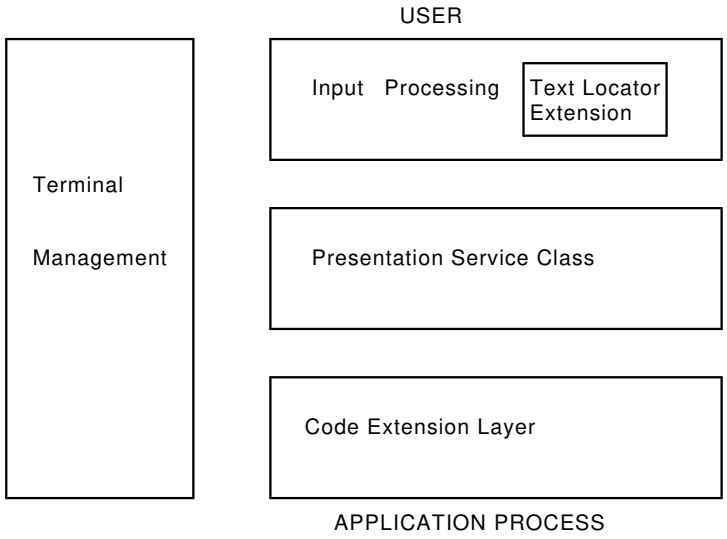
1.1 SCOPE

This standard applies to all Digital products that implement support for a locator device and are intended to be certified as conforming to the Terminal Interface Architecture (TIA) as shown in Figure 1. It also applies to software intended to use the locator interface in a conforming manner.

1.2 Relationship to TIA

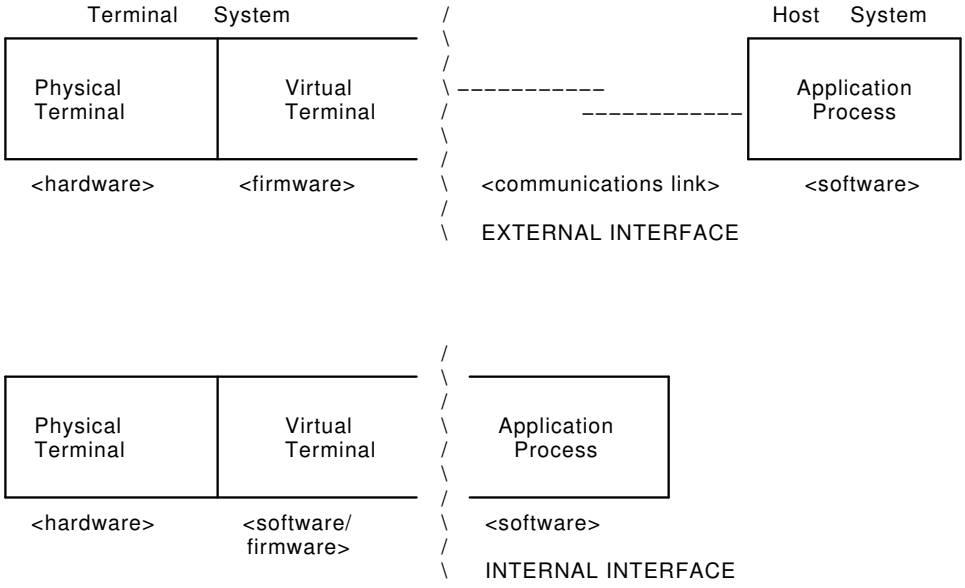
The locator interface forms two extensions to the Character Cell Display service class: Text Locator and Locator Port. Both can be implemented at any conformance level. The primary Device Attributes (DA) response will report the locator extensions as parameter value 15 (Locator Port), and parameter value 29 (Text Locator). The Locator Port Extension supports DECLKD. If the device includes the ReGIS or sixel graphics extensions, additional interactions with these protocols are defined. The Text Locator Extension supports the text locator features described in this document (DECELR, DECLRP, DECRQLP, DECSLE, DECEFR). Both extensions allow the status of the locator port to be interrogated using a Device Status Report (DSR) function.

Figure 1: Structuring of the Terminal Interface Architecture



The interfaces defined within this specification apply to both internal and external product interfaces (as shown in Figure 2). External interfaces are interfaces between a terminal, personal computer or workstation and a remote system. Internal interfaces are interfaces between a terminal subsystem and software processes running within a terminal, personal computer, or workstation.

Figure 2: External and Internal Terminal Interfaces



2 TERMINOLOGY

Filter rectangle—A rectangular area in a video display used for selecting (filtering) which locator movements will be reported to the host. Moving the locator so that the input cursor is moved outside the filter rectangle causes a locator report to be transmitted to the host.

Locator—A device such as a mouse or tablet used for entering position coordinates (pointing) on a video display.

Session—A connection between a single virtual terminal and a host computer.

Virtual terminal—Consists of all the context (state information) of a real terminal but is able to share physical resources (such as the keyboard, display, and communication lines) with other virtual terminals. This allows a single physical device to appear as more than one terminal to a host computer.

Window—An area of the screen used to display information from a virtual terminal.

Window manager—Software or firmware that controls the use of windows.

3 LOCATOR REPORTING MODEL

When a locator device is present and enabled, a separate input cursor appears that is moved by the terminal to follow the locator without host intervention. Individual locator events such as locator button transitions or movement can be programmed to send locator reports to the host.

Each locator report shall include: (1) the specific event that initiated the report; (2) the current state of the locator keys; and (3) the coordinates of the input cursor at the time of the event. The events that can initiate a locator report are a button transition (up or down), locator movement, or an explicit host request.

Reporting both the event that triggered the report, and the current button state allows software to interpret locator activity without keeping track of previous events or button state. In a multiprocess shared locator environment, an application may not know the previous button state. This dual reporting also allows applications to recover from lost locator reports.

Each locator event generates a single report. In the rare situation where two events occur simultaneously (within a single-sampling period), the terminal shall report this as two separate events. The order of reporting shall be by increasing event code number (left button first).

Locator events are queued in the keyboard input silo just like keystrokes. Each locator event occupies one position in the silo (the keyboard silo currently must have at least nine positions). If the input silo becomes full, the locator and keyboard are locked until there is again room in the silo. The sequential order of keystroke and locator events shall be strictly maintained.

Guideline: It is the responsibility of the host to accept data fast enough to avoid locking the locator unintentionally. The limited buffering inside the terminal gives the host a little more time to process locator events smoothly.

When the locator is locked, the terminal continues to track the locator but the input cursor changes shape to indicate the locked condition (not mandatory). The alternate cursor shape indicates that locator button transitions will be ignored, but allows the user to continue positioning in anticipation of the locator being unlocked. The locator is automatically locked any time the input silo is full.

Locator-ahead, analogous to keyboard type-ahead is supported by having each report include the locator position at the time of the event, and maintaining the sequential order of keystroke and locator events.

3.1 INTERACTION WITH SESSIONS AND WINDOWS

Since locator events are queued in the keyboard input silo along with keystrokes, locator and keyboard input should be associated with the same session (virtual terminal) at all times. The session to receive these events is sometimes called the *active session*.

In a multisession windowing environment, the input cursor is allowed to roam freely over the entire screen in response to locator movement. The input cursor is never occluded when locator reporting is enabled in one or more sessions. Each session enables locator reporting independently. The following requirements apply to locator interaction with session windows and scroll regions in a multisession windowing environment.

1. The input cursor is within the active session's window. Pressing a button on the locator sends a locator report when enabled.
2. The input cursor is inside the active session's window but outside the range of defined coordinates for that session. Pressing a button on the locator shall generate a report with omitted coordinates (position undefined). For example, the input cursor is outside the active scrolling region, and the origin mode is set to relative.
3. The input cursor is not contained in any virtual terminal's window. Pressing a button on the locator shall have no effect on any of the virtual terminals.
4. The input cursor is within a window of a session that is not the active session. Pressing a button on the locator will normally make the session containing the locator cursor the active session, possibly changing the occlusion order of windows and the shape of the locator cursor (not mandatory).

   In this case, the *window manager* is free to define its own user interface. Two recommendations (not mandatory) are: (1) no locator report should be sent to the previous active session, because the locator is not in its window; and (2) a locator report should not be transmitted if locator reporting is enabled in the new session, to avoid application side effects when selecting another window.

   Implementation Guideline: DECterm Version 1.0 followed recommendation (1) above, but did not follow recommendation (2). The result is that selecting a new DECterm window often repositions the cursor in that window. Personal computer windowing systems usually require the user to click once to select the window and click again in the window to move the active position.

4 CONTROLLING LOCATOR REPORTS

ENABLE LOCATOR REPORTS DECELR

Levels: 1x, 2x, 3x, 4x (Text Locator)

Purpose: To enable locator reporting

Format:

CSI	Ps	;	Pu	'	z
9/11	3/?	3/11	3/?	2/7	7/10

The value of Ps controls locator reporting as follows:
0—Locator disabled (default)
1—Locator reports enabled
2—One shot (allow one report, then disable)

Pu specifies the coordinate units for locator reports:
0—(or omitted) Default to character cells
1—Device physical pixels
2—Character cells

Description: When disabled (the power-up default), the locator cursor does not appear, and the locator buttons are inactive. When enabled, the locator cursor is visible, and the terminal tracks the locator locally with no host intervention. Individual locator events, such as locator button transitions or movements, may be programmed to send locator reports to the host.

One shot mode is provided for applications that desire simple graphics input similar to Tektronix GIN mode (no unsolicited reports). If parameter value 2 is selected, the next trigger event that occurs generates a single locator report. No further locator reports occur (the locator is disabled), until another DECELR sequence is received.

The coordinate units for locator position reports may be selected to either of two coordinate systems used by terminal software at the lowest level. Device physical pixels are useful when the device is capable of addressing individual dots on the display, such as with the sixel graphics extension. On devices that support character cell addressing only, device physical pixels (picture elements) may be character cells.

NOTE

Undefined values for Ps or Pu causes the entire sequence to be ignored.

State Affected:

locator_mode_t locator_mode;
locator_coordinate_mode_t locator_coordinate_mode;

LOCATOR REPORT **DECLRP**

Levels: 1x, 2x, 3x, 4x (Text Locator)

Purpose: To transmit locator information to the host

Format:

```
CSI     Pe     ;     Pb     ;     Pr     ;     Pc     ;     Pp     &     w
9/11                                                              2/6   7/7
```

Pe is the event code.
Pb is the button code.
Pr is the row coordinate.
Pc is the column coordinate.
Pp is the third coordinate (page number).

Description: When a selected trigger event occurs, such as a button press or release, the terminal transmits a locator report to the host as a DECLRP sequence.

Pe, the event code indicates what event caused this report to be generated. The following event codes are defined:

0—Request; the terminal received an explicit request for a locator report, but the locator is unavailable (not enabled, or physically not present)
1—Request; the terminal received an explicit request for a locator report
2—Left button down
3—Left button up
4—Middle button down
5—Middle button up
6—Right button down
7—Right button up
8—Fourth button down
9—Fourth button up
10—Locator outside filter rectangle

If Pe is 0 or omitted, all other parameters shall not be sent because the locator is unavailable. If Pe > 10, the entire sequence shall be ignored.

Pb is the button code, ASCII decimal 0 - 15, indicating which, if any, of up to 4 buttons are down. The state of up to 4 buttons on the locator corresponds to the low 4 bits of the decimal value; a 1 means button is depressed.

0—No buttons down
1—Right
2—Middle
4—Left
8—Fourth

If Pb is omitted, it shall be interpreted as Pb = 0, no buttons down.

Pr is the row coordinate of the locator position in the page encoded as an ASCII decimal value. If Pr is omitted, the locator position is undefined (outside the terminal window for example).

Pc is the column coordinate of the locator position in the page, encoded as an ASCII decimal value. If Pc is omitted, the locator position is undefined (outside the terminal window for example).

Pp is the page coordinate of the locator position encoded as an ASCII decimal value. The page coordinate may be omitted if the locator is on page one (the default).

NOTES

1. **If locator reporting has been enabled to *one shot* mode (DECELR with Ps = 2), a single locator report (DECLRP) shall reset locator reporting mode to disabled.**
2. **The parameter values Pr, Pc, and Pp, are expressed in the units selected by the last received Enable Locator Reports (DECELR) command.**
3. **The parameter values Pr and Pc shall be omitted, indicating locator position undefined, if a position report (DECLRP) is generated when the locator cursor is outside the range of defined coordinates for the reporting virtual terminal.**

State Affected:

locator_reporting_mode_t locator_reporting_mode;

Levels: 1x, 2x, 3x, 4x (Text Locator)

Purpose: Request the terminal transmit a locator position report

Format:

```
CSI         Ps          '           |
9/11                    2/7         7/12
```

The value of Ps controls the locator report sent as follows:
0—(or omitted) Default to 1.
1—Transmit a single locator report (DECLRP).

Description: The host may explicitly request a Locator Position Report (DECLRP) at any time locator reporting is enabled through Enable Locator Reporting (DECELR). Upon receipt of DECRQLP, the terminal shall respond with a single DECLRP with an event code of 1.

If the session receiving the request is the active session, but the locator is not within the defined coordinate range for that session, the terminal shall respond with a single DECLRP with omitted coordinate parameter values.

If the session receiving the request is not currently active (the locator is being used in another session), the terminal shall respond with omitted coordinates (locator position undefined) even if the input cursor is physically over the inactive session's window. Locator state from the active session shall not be made available to inactive sessions.

If locator reporting is disabled, the terminal shall respond with a single DECLRP with an event code of 0 (indicating locator not available to avoid timing out the application).

APPLICATION NOTE

If the terminal responds that the locator position is undefined (omitted coordinates), the application can ask to be notified the next time that session is active, and the locator is within the defined coordinate range. See DECEFR (Enable Filter Rectangle).

Levels: 1x, 2x, 3x, 4x (Text Locator)

Purpose: To select which locator events will generate reports

Format:

```
CSI         Ps...Ps         '           {
9/11                        2/7         7/11
```

Ps ... Ps is one or more selective parameters that may assume the following values:
- 0—Respond only to explicit host requests (default, also cancels any pending filter rectangle)
- 1—Report button down transitions
- 2—Do not report button down transitions
- 3—Report button up transitions
- 4—Do not report button up transitions

Description: DECSLE selects which locator events shall generate unsolicited reports according to the parameter values.

ENABLE FILTER RECTANGLE DECEFR

Levels: 1x, 2x, 3x, 4x (Text Locator)

Purpose: To cause locator movement to be reported to the host.

Format:

```
CSI    Pt    ;    Pl    ;    Pb    ;    Pr    '    w
9/11                                          2/7  7/7
```

Pt—Top boundary of filter rectangle
Pl—Left boundary of filter rectangle
Pb—Bottom boundary of filter rectangle
Pr—Right boundary of filter rectangle

Description: The DECEFR control sequence defines the coordinates of a filter rectangle and activates it. The next time the locator is detected to be outside that filter rectangle, an outside rectangle event is generated and the rectangle is de-activated. Filter rectangles are always treated as *one-shot* events.

Defining a new rectangle cancels the previous definition, if any, and activates the new filter rectangle.

Pt, Pl, Pb, and Pr are in coordinates units specified by the last DECELR sequence. The filter rectangle includes the boundaries, similar to other rectangular area operations. The origin is coordinate pair 1:1 in the upper-left corner. If any parameters are omitted, they are defaulted to the current locator position. Sending DECEFR with no parameters will cause the application to be notified for any locator movement within the defined coordinate space for that virtual terminal (*unfiltered movement event*).

If a rectangle that does not contain the locator is specified, and the locator is within the defined coordinate space for that session, the terminal will generate an outside rectangle report immediately and de-activate it.

NOTES

1. **DECELR cancels any previous filter rectangle definition. This guarantees that when an application enables locator reports, there will never be an outstanding filter rectangle.**
2. **If a filter rectangle lies on the edge of the defined coordinate space for the active session, and the locator crosses that edge, the rectangle shall be triggered to send a report with omitted coordinates (locator position undefined).**

   If the active session receives a filter rectangle with explicit coordinates while the locator is outside the defined coordinate space, the rectangle shall be triggered to send a report with omitted coordinates (locator position undefined).

If the active session receives a filter rectangle with omitted coordinates (that is, uses the current position) while the locator is outside the defined coordinate space (position undefined), the rectangle shall be triggered the next time the locator is within the defined coordinate space. This allows applications to be notified the next time the locator is within the defined coordinate space without polling repeatedly.

3. **If a session that is not the active session receives a filter rectangle with explicit coordinates, it shall trigger immediately with position undefined. If a session that is not the active session receives a rectangle with omitted coordinates, it shall trigger the next time the locator is within the defined coordinate space for that session, which cannot happen until the session becomes active.**
4. **If the terminal receives a filter rectangle when locator reporting is not enabled, the rectangle shall be triggered to send a report indicating that the locator is not available. This is to avoid hanging the application while it waits for a locator report that will never occur.**

5 LOCATOR SUPPORT FOR GRAPHICS (LOCATOR PORT EXTENSION)

The locator can also be used with the ReGIS Extension, and in Tektronix GIN mode during Tektronix 401x emulation. See *DEC STD 070-8 Video and Printer Standards Reference Manual - ReGIS Graphics Extension* for more information on ReGIS commands.

5.1 ReGIS ONE-SHOT GRAPHICS INPUT MODE

ReGIS One-Shot Graphics Input Mode is selected with R(I0). Once selected, the application may request graphics input using the report position interactive command, R(P(I)).

ReGIS One-Shot Graphics Input Mode is provided for backward compatibility with the VT240. When an application requests graphics input, a cross hair cursor appears which may be positioned using either the arrow keys (as on the VT240) or a locator device. Pressing any non-arrow key that is not dead on the keyboard or a button on the locator will cause the following actions:

1. The ASCII code or codes for the non-arrow key that was pressed is sent to the host. Each locator button can be programmed to send a sequence of 0 to 6 characters. This allows the locator to be programmed to work with existing applications (see DECLKD, paragraph 5.4).
2. The coordinates of the input cursor at the time the non-arrow key was depressed are sent to the host, expressed as an absolute bracketed extent in user coordinates.
3. The graphics input cursor disappears from the screen and the terminal exits graphics input mode.

While the terminal is in graphics input mode, no further data from the application (screen output) is processed until the locator input is complete and a report is generated.

The mouse and arrow keys may be intermixed freely in ReGIS One-Shot Graphics Input Mode. Since the tablet is an absolute positioning device, use of the arrow keys in combination with the tablet would cause inconsistent and confusing behavior. The arrow keys are disabled for input cursor positioning when the tablet is in proximity because the tablet establishes an absolute screen position.

5.2 ReGIS MULTIPLE INPUT MODE

ReGIS Multiple Input Mode is selected with R(I1). In this mode, a graphics input cursor is displayed continuously, and individual locator events may be programmed to send unsolicited position reports to the host. Characters received from the host are executed instead of buffered, so graphics output and graphics input may occur simultaneously. In Multiple Input Mode, the input cursor continues to be displayed and the mode continues to be in effect until explicitly exited by command R(I0). The position of the input cursor may be polled with R(P(I)) at any time while in this mode. If report position interactive is received, the report will be prefixed by the *null button* because no button transition initiated the report.

Since host input is still being processed, it is possible to exit ReGIS (terminal receives String Terminator) while in Multiple Input Mode. If this happens, the ReGIS locator will be disabled until ReGIS is re-entered, at which time multiple input mode resumes with the input cursor at its last known position.

In Multiple Input Mode, locator key transitions for which the key definition is not empty (see DECLKD) send a position report as follows:

1. The locator key definition string for the corresponding button transition is sent.
2. The coordinates of the input cursor at the time of the key transition are sent to the host expressed as an absolute bracketed extent in user coordinates.
3. The report ends with a carriage return.

Examples:

```
<ESC>[241~[102.5,200]<CR>
```

The left mouse button was pressed. <ESC>[241~ is the default sequence for left button down transitions. Input cursor is at 102.5,200.

```
<ESC>[240~[100,100]<CR>
```

The terminal received R(P(I)) in multiple input mode. <ESC>[240~ is the *null button* sequence.

5.3 TEKTRONIX GIN MODE

Tektronix GIN Mode is only available during Tektronix 4010/4014 emulation. GIN mode is similar to ReGIS One-Shot Graphics Input mode with minor exceptions. The GIN request and resulting report sequences are compatible with the Tektronix 4010/4014 series terminals. Only the cross hair graphics cursor is supported. Tektronix 4010/4014 emulation is an exception to the architecture implemented by some graphic terminals.

5.4 DEFINING LOCATOR KEYS FOR GRAPHICS INPUT

LOCATOR KEY DEFINITION **DECLKD**

Levels: 1x, 2x, 3x, 4x (Locator Port)

Purpose: To assign character strings to the locator keys for ReGIS One-Shot or Multiple Graphics Input Mode

Format:

```
DCS  Pc   $    w   Ky1 / Std1 / Stu1 ; ... ; Kyn / Stnd / Stnu  ST
9/0       2/4  7/7                                              9/12
```

Pc—Clear parameter
0—(or omitted) Clear all LKDs before loading new values.
All button definition strings are empty (not the default).
1—Clear old definition only for keys that are redefined.

Kyn / Stnd / Stnu—Key selection code n, slash delimiter (2/15), and string parameter n for down and up key transitions. Kyn is a single ASCII digit, and Std/Stu is a series of ASCII hex pairs. If Std or Stu is omitted, the corresponding button string will be empty. Key definition strings are delimited with 3/11 (";").

Description: The DECLKD device control string downline loads one or more key definitions for use by the Locator device during ReGIS One-Shot or Multiple Graphics Input Modes. These definitions are called Locator Key Definitions (LKDs).

There are six bytes available to each of the locator keys (up to four). A power-up restart or Reset to Initial State (RIS) will cause the LKDs to be set to their default value. LKDs are not affected by Soft Terminal Reset (DECSTR).

Default Locator Key Definitions

No button transition ESC [240 ~
Ky1 down transition ESC [241 ~
Ky2 down transition ESC [243 ~
Ky3 down transition ESC [245 ~
Ky4 down transition ESC [247 ~

Where:

Ky1 = B1 = left = barrel button
Ky2 = B2 = middle = tip button
Ky3 = B3 = right
Ky4 = B4 (tablet cursor only)

Up Transitions are ignored by default. The following locator key up definitions are recommended:

Ky1 up transition ESC [242 ~
Ky2 up transition ESC [244 ~
Ky3 up transition ESC [246 ~
Ky4 up transition ESC [248 ~

NOTES

1. **DECLKD is intended for older applications that use ReGIS one-shot input mode with keystroke commands like A, B, C, and so forth. These commands can be re-bound to buttons on the mouse by sending DECLKD (possibly before running the application).**
2. **A locator transition for which the key definition is empty will not terminate ReGIS One-Shot Graphics Input Mode.**

5.5 COMBINING GRAPHICS AND ANSI LOCATOR INPUT

Support for graphics input in ReGIS is extended by allowing ANSI locator input (Text Locator Extension) to operate normally regardless of whether the host output stream is being interpreted as ANSI or ReGIS. If ANSI locator reporting is enabled, keystrokes and locator position reports can be generated without being solicited from the host. Characters received from the host are executed instead of buffered so graphics output and graphics input can occur simultaneously.

If One-Shot Graphics Input Mode is entered (ReGIS report position interactive) while ANSI locator reporting is enabled, the locator cursor should change to a cross hair (not mandatory). Pressing a non-arrow key on the keyboard shall send the character for that key followed by the ReGIS user coordinates as a bracketed extent. If a locator button had been pressed instead, the characters for the locator button (if any) would be sent followed by the ReGIS position report, and finally the ANSI locator report (DECLRP) if enabled. Upon sending the ReGIS position report, the terminal shall exit One-Shot Graphics Input Mode, and the input cursor shall return to its previous state.

The ANSI locator report is sent in the above situation (if enabled) to keep the two modes independent. This allows filter rectangles to continue operating, and also keeps the ANSI state (last DECLRP seen) consistent with the last button transition. The order of reports is chosen to allow a subroutine to send R(P(I)) and read the ReGIS response that follows without regard to whether ANSI locator reports are enabled.

Since the ANSI locator report is in the form of a control sequence, it should not interfere with ReGIS reports. No special procedure is used to indicate ReGIS data from the terminal. This is backward compatible with the VT240 since ANSI locator reports can only occur if ANSI locator reporting is enabled.

The suspension of graphics output during ReGIS One-Shot Graphics Input Mode remains the same. This is necessary to support rubber band cursors. Rubber band cursors use the ReGIS output position as one reference point, and the locator input position as the other. Rubber band cursors are specified as an option on the ReGIS report position interactive command.

6 LOCATOR DEVICE STATUS

DEVICE STATUS REPORT (Locator Status) **DSR**

Levels: 1x, 2x, 3x, 4x (Locator Port or Text Locator)

Purpose: Cause the terminal to return the current functional status of the Locator

Format:

```
CSI          ?          Ps         n
9/11         3/15       Ps         6/14
```

Description: The DSR request with private selective parameter 55 or 56 causes the terminal to respond with a similar DSR control function, using a parameter from the list below to indicate its current functional status.

?55 Request locator status (command from host)
?53 No locator
?50 Locator ready
?58 Locator busy

?56 Host requests identity of device on locator port
?57;0 "Unknown Locator" response
?57;1 Device is Digital Corporate Mouse
?57;2 Device is Digital Corporate Tablet

The *no locator* response indicates no locator is currently plugged in, or the last device plugged in could not be initialized or has not transmitted a successful self-test message.

The *locator ready* response indicates a locator device is plugged in and has transmitted a successful self-test message.

The locator busy response can occur when an alternate session has selected locator controller mode (see following).

7 LOCATOR CONTROLLER MODE (GUIDELINE—DOCUMENTED EXCEPTION)

Locator Controller Mode allows the host to communicate directly with the locator device without terminal intervention (similar to printer controller mode). When locator controller mode is set, all data received at the host port is transferred directly to the locator port without interpretation by the display terminal. The only exceptions are the communications control characters XON/XOFF (if enabled), and the control sequence to disabled locator controller mode. All characters received at locator port are transferred to the host port without interpretation. The host assumes full responsibility for the locator device.

Locator controller mode is desirable for two reasons:

1. It allows the host to explicitly initialize or configure locator devices. A foreign locator device might not wake up in Digital format, for example.
2. It allows the locator port to be used for other auxiliary input devices.

Locator controller mode uses the Media Copy control sequence for a secondary auxiliary device:

Format:

```
CSI       6        i         (Turn off locator controller mode)
9/11      3/6      6/9

CSI       7        i         (Turn on locator controller mode)
9/11      3/7      6/9
```

APPENDIX A REFERENCED DOCUMENTS

A.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00070-01	*DEC STD 070-1 Video Systems Reference Manual - Concepts and Conformance Criteria*
EL-00070-08	*DEC STD 070-8 Video and Printer Standards Reference Manual - ReGIS Graphics Extension*

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